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ABSTRACT

The effectiveness of videotape feedback, verbal feedback, and a combination of videotape and verbal feedback upon the psychomotor performance of 90 borderline, mild, and moderately retarded adolescent students in a residential school was compared. The students were divided into a high intelligence group and a low intelligence group and then randomly assigned in groups of 15 to the videotape, verbal, and combination conditions. A mailing task involving envelope stuffing was demonstrated to each student by videotape, after which the student was asked to perform the psychomotor task. Measures of performance were the student's scores for the first and last trials of the task and the total number of envelopes stuffed in 30 minutes. Covariant and two-way analysis of the students' scores on the envelope stuffing and two-way analysis of variance for number of envelopes stuffed during the three conditions indicated that the verbal feedback group performed significantly higher than the other groups, that there was no difference in number of envelopes stuffed by the groups, and that the high intelligence groups stuffed a larger number of envelopes than the low intelligence groups. (Author/MC)

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THE EFFECTS OF FEEDBACK MEDIA UPON PSYCHOMOTOR PERFORMANCE OF MENTAL RETARDATES

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ABSTRACT

Purpose. The purpose of this study was to compare experimentally the effect of feedback treatments upon the performance of a manipulative psychomotor task by mentally retarded. More specifically, the study attempted to answer this question: Which of the following three feedback methods has the greatest effect upon the psychomotor performance of mental retardates: Videotape, verbal, or a combination of videotape and verbal feedback?

Procedures. The data for statistical analysis were provided by ninety students with borderline, mild, or moderate mental retardation at the Higginsville State School, Higginsville, Missouri.

The statistical design for the study was a 2 x 3 randomized block design. The subjects were divided into two groups

on the basis of intelligence quotients on the Wechsler Intelligence Scale. Those with intelligence quotients above the median of the entire group were assigned to the high intelligence group; those with intelligence quotients below the median were assigned to the low intelligence group. Students were then assigned randomly to one of three treatment groups: videotape, verbal, or a combination of videotape and verbal. Each treatment cell was assigned 15 students.

A mailing task consisting of folding letters, inserting letters into envelopes, sealing envelopes, and affixing stamps was selected as the psychomotor task. A demonstration was presented to each student individually by means of a videotape recording. Immmediately after the demonstration, the student was asked to perform the same task. The measures of performance were the student's scores on the checksheet for the first and last trials of the envelope stuffing task and the total number of envelopes stuffed in thirty minutes. Three practice sessions, each of two minutes' duration, were provided for each subject after the first trial. The subject was then subjected to one of the three feedback treatments (videotape, verbal, or a combination of videotape and verbal).

The data were analyzed by using a two-way analysis of covariance for the performance scores on the envelope stuffing task and a two-way analysis of variance for the number of envelopes stuffed.

Findings and Conclusions. A significant difference was found in performance scores on the envelope stuffing task. The Newman-Keuls Multiple Comparison Test revealed that the verbal feedback group performed significantly higher than either the videotape feedback group or the combination of videotape and verbal feedback group. It may be concluded that verbal feedback is an important factor in skill development among mental retardates regardless of level of intelligence.

For the number of envelopes stuffed, the difference among the means of feedback treatment groups was not significant. However, a significant difference was found between the number of envelopes stuffed by students of different levels of intelligence. The high intelligence quotient group stuffed a larger number of envelopes in a given time period than the low intelligence quotient group. Therefore, it may be concluded that, regardless of feedback treatment, faster production can be expected of higher functioning mental retardates.

There was no significant interaction between intelligence levels and feedback treatments.

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CHAPTER I

INTRODUCTION

During the past decade there has been increasing emphasis in the development of occupational education programs for disadvantaged and handicapped students.

The public school often bases its efforts on assumptions which may not be valid for all students. The Educational Policies Commission has stated that the values of the teacher, the content of the program, and the very purposes of schooling may be appropriate for "normal" middle-class children but not for disadvantaged and handicapped children.[1]

The trend for the disadvantaged and handicapped is toward a vocationally oriented education as evidenced by the development of new vocational schools and programs for the disadvantaged and handicapped in many states. The establishment of special vocational schools and programs is a step in providing meaningful and relevant education for the disadvantaged and handicapped; however, a real problem remains for the teachers. According to Bland, the primary problem is the identification of teaching methods, techniques, and

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[1] Education and the Disadvantaged American, Educational Policies Commission, National Education Association, 1201 Sixteenth Street, N. W., Washington D. C., 1963, p. 7.

materials that are relatively most effective in educating disadvantaged and handicapped students.[2]

The area of psychomotor learning and skill development in vocational education has been a focus for research in recent years as evidenced by the number of studies conducted in this area. It has been found that the successful completion of psychomotor tasks depends upon a variety of factors such as physical maturity, manual dexterity, hand-eye coordination, intelligence, and transfer of learning from previously learned skills.

In learning a psychomotor skill, Fitts identifies three phases - the cognitive, the fixation, and the autonomous - through which the student passes.[3] In the cognitive phase the students attempt to intellectualize the skill they are to perform. They develop plans which guide the execution of the skill. During this phase, the instructor and the students try to analyze the skills and to verbalize about what is being learned. The instructor describes what to expect and what to do. He describes procedures and gives information about errors, which occur with great frequency in this phase. One of the series of experiments demonstrating the importance of "intellectualization" in the early

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[2]Larson Bland, "A Comparison of Three Methods of Teaching Selected Informational Topics of Basic Electricity to Disadvantaged Students," (Unpublished Doctor's Dissertation, University of Missouri-Columbia, 1972).

[3]Robert Glaser, Training Research and Education. (New York: Science Editions, 1965), pp. 186-189.

stages of skill learning was conducted by A. C. Williams and his associates at the University of Illinois. The study was concerned with pilot training prior to the first solo flight. They found that the average number of hours required to learn to solo could be reduced from eight to four by providing certain basic learning conditions. Relevant to this phase of skill learning, they developed a number of procedures to enhance understanding of flight problems and flight procedures.

In the fixation phase the correct behavior patterns are practiced until the chance of making incorrect responses is reduced to zero; the behavior becomes fixed. At the most basic level the student is learning to link together the basic units of the chain. At a more advanced level he is learning to organize the chains into an overall pattern. Fitts used the following examples:[4]

> ". . . In the case of the aircraft pilot this phase would extend roughly from before initial solo through the time at which a private license is granted and perhaps to the first hundred hours or so of flying. In the case of a typist it would extend from the point at which the student has learned the position of the different keys and how the fingers are used in striking them to the point where he has perhaps graduated from his first typing course, and reduced his errors to less than one per cent, and has acquired a fair degree of typing speed."

Finally, the autonomous phase is characterized by increasing speed of performance and improving accuracy to the point at which errors are least likely to occur. In this phase the student also increases resistance to stress and

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[4] Ibid., p. 188.

to the interference of outside activities. This is the stage achieved by the expert, for whom the performance of the skill has become a thoroughly established habit whereby the individual's physical responses take a minimum of thought as they become involuntary and nearly automatic. The available evidence indicates that performance can improve through millions of cycles of practice.

Feedback in the form of knowledge of results and its effect on psychomotor performance was first studied in the classical experiments of Thorndike. Other psychologists have also studied the learning of simple perceptual motor skills as affected by knowledge of results.

"In performing a motor skill, reinforcement usually takes the form of feedback to the learner concerning the degree of correctness (or error) of his response."[5] One form of feedback is of a kinesthetic nature, which is a sensation from the muscles. Feedback is also provided by sight and other senses. For the person who knows correct performance, these sensations provide warnings whenever he starts to make an error. This feedback occurs so quickly and automatically that the skilled person may be unaware that it is happening.[6]

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[5]Robert M. Gagné and Edwin A. Fleishman, Psychology and Human Performance. (New York: Holt Dryden and Company, 1959), p. 245.

[6]Winfred F. Hill, Learning: A Survey of Psychological Interpretations. (San Francisco: Chandler Publishing Company, 1963), p. 200.

Previous research studies have used various techniques to provide feedback in the development of psychomotor skill. The graph check sequence camera has been used to provide subjects with a series of still photographs of their performance. The checksheet and videotape recording have also been used in a number of studies in an attempt to identify a relatively effective kind of feedback.

Caine[7] used the videotape replay technique in an attempt to increase students' bowling skills. Two groups of students were used in the experiment; one group received videotape feedback showing their own performance, while the other group did not receive the videotape feedback. Both groups received the same instruction and demonstration prior to the practice sessions. Even though no significant difference existed between the group that received video replay and the group that did not, there was significant improvement in performance within the group that received the video feedback but not within the group that did not receive the video feedback.

Hurley[8] studied three types of feedback and their effects upon the quality of psychomotor performance. The subjects, fourth and sixth grade students, were given

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[7]John E. Caine, "The Effects of Instant Analysis and Reinforcement of Motor Performance Through the Use of Cinematography Techniques Related to Television," (Unpublished Doctor's Dissertation, Colorado State College, 1966).

[8]Carl E. Hurley, "The Effects of Feedback on Psychomotor Performance of Fourth and Sixth Grade Students," (Unpublished Doctor's Dissertation, University of Missouri-Columbia, 1971).

feedback in the form of videotape replay alone, a checksheet alone, and a combination of videotape and checksheet feedback. Statistical analysis revealed that the most effective forms of feedback were the checksheet alone and a combination of videotape and checksheet, with the videotape feedback alone being the least beneficial in improving performance.

The previous research studies recommended that feedback media in skill development and psychomotor performance should be further explored. These studies also recommended that feedback should be further investigated using different age groups, intelligence levels, and psychomotor tasks.

Statement of the Problem

Since the passage of the Vocational Education Amendments of 1968, vocational education for the disadvantaged and handicapped has been emphasized. Job skills training for the mentally retarded has been neglected because of their limited abilities. However, many communities have realized the problem and have established sheltered workshops for these mental retardates, where they perform simple tasks of assembling, sorting, and fabricating. Here in Missouri, three state schools have initiated a pre-sheltered workshop training program with the support of federal funds to train mental retardates to become productive citizens.

Vocational instructors experience difficulty as they attempt to provide instruction which is designed to assist the mentally retarded student in the development of

psychomotor skill. More specifically, the instructor is faced with the task of identifying instructional techniques which are relatively effective in helping the mentally retarded learner develop psychomotor skills. One of the most effective techniques used to facilitate skill development among "normal" learners is feedback in the form of knowledge of results. However, the extent to which feedback in the form of knowledge of results affects psychomotor skill development among mental retardates is not known.

Purpose of the Study

The purpose of this study was to compare experimentally the effect of feedback treatments upon the quality of manipulative psychomotor tasks. More specifically, the study attempted to answer this question: Which of the following three feedback methods has the greatest effect upon psychomotor performance of mental retardates: videotape feedback, verbal feedback, or a combination of videotape and verbal feedback?

Definition of Terms

Mental retardation refers to subaverage general intellectual functioning which originated during the developmental period and is associated with impairment in adaptive behavior.[9]

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[9]Modifications in the Manual on Terminology and Classification in Mental Retardation, American Journal of Mental Retardation, American Journal of Mental Deficiency, Vol. 65, No. 4, January, 1961.

In this study mental retardates refer to selected students of the Higginsville State School between 14 and 25 years of age who have no apparent emotional or physical condition which would prevent normal performance of manual tasks.

Feedback as used in this study refers to the information (or message) received by the learner through videotape or checksheet, which creates an awareness of the results of his behavior.[10]

Psychomotor performance refers to the achievement of certain manipulative tasks involving psychomotor skills as well as the application of procedural information which is commonly measured by assessing the product resulting from the achievement of the task.[11] In this study psychomotor performance refers to the student's folding letters, inserting them into envelopes, sealing envelopes, and affixing stamps on the envelopes.

Sheltered workshop is defined as a charitable, religious, educational, or philanthropic organization or institute conducted not for profit but for the purpose of carrying out a recognized program of rehabilitation for mentally retarded and physically handicapped individuals and for providing such individuals with remunerative employment or other rehabilitating activities of an educational or a therapeutic nature.

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[10]Hurley, op. cit., p. 7.

[11]Norman A. Baker, "The Effects of Differing Speeds of Videotape Feedback and Levels of Perceptual Speed on Psychomotor Performance," (Unpublished Doctor's Dissertation, University of Missouri-Columbia, 1971).

Cognition refers to such mental processes as concept formation, problem solving, imagination, perception, and intelligence.[12] In this study it refers to viewing the videotape instruction and to receiving the verbal feedback.

Assumptions of the Study

This experiment was conducted under the following assumptions: (1) that each subject would experience the feedback from one of three treatments, (2) that any differences in the subject's skill development affected by feedback would be reflected in his performance, (3) that each subject would perform the task to the best of his ability, and (4) that the instruments utilized for measuring the variables would be valid and reliable.

Sources of Data and Method of Study

Selection of Subjects. The subjects for the study were 90 students selected from approximately 370 students enrolled in an education program at the Higginsville State School, Higginsville, Missouri. Higginsville State School is a state supported institution accommodating approximately 430 higher functioning mental retardates.

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[12]Robert N. Singer, Motor Learning and Human Performance: An Application to Physical Education Skills. (London: The Macmillan Company, 1968), p. 87.

Design of the Study. The students who were selected for the study were divided into two groups according to mental ability. Assignment of subjects to treatments was based on intelligence quotient. Students with intelligence quotients above the median of the entire group were assigned to a high group; those with intelligence quotients below the median were assigned to a low group. These groups were then assigned randomly to three treatment groups. Figure 1 presents a symbolic representation of the design.

		TYPE OF FEEDBACK		
		Videotape	Verbal	Videotape & Verbal
I.Q.	High	n=15	n=15	n=15
	Low	n=15	n=15	n=15

Figure 1

Research Design

The psychomotor task was presented individually to the subjects through the use of a videotape recording. The instructional videotape recording was identical for all subjects. The materials shown in the videotape were also identical to those that were used by the subjects in performing the task.

Feedback Treatments. After viewing the videotape instruction and performing the task, the subject then received the respective feedback treatment. Subjects in the videotape feedback treatment group viewed their own performance

on videotape, whereas those in the verbal feedback treatment group rated their performance on a checksheet. Subjects in the combination of videotape and verbal feedback treatment group viewed a videotape recording of their own performance while rating the performance on a checksheet.

Statement of Hypotheses

The general research hypothesis of this study was that a significant difference exists in the level of psychomotor performance of mental retardates who received three different feedback treatments (videotape, verbal, and a combination of videotape and verbal) of their own performance.

Stated in the null form for purposes of statistical treatment, the following hypotheses were tested:

Ho_1: There is no significant difference among adjusted mean scores on an envelope stuffing task by students experiencing the three experimental treatments.

Ho_2: There is no significant difference among mean numbers of total envelopes stuffed by students experiencing the three experimental treatments.

Levels of intelligence (high and low) were used for a blocking purpose and were of secondary concern. The effect of treatments on different levels of intelligence and its analysis are presented in Chapter IV.

Analysis of Data. A 2 x 3 randomized block design as described by Kirk[13] was used to test the statistical

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[13]Roger E. Kirk, Experimental Design: Procedures for the Behavioral Sciences. (Belmont: Brooks/Cole Publishing Company, 1968), pp. 14-16 and 131-150.

significance of differences. The null hypotheses were tested at the .05 level of significance by computing a two-way analysis of covariance for Ho_1 and a two-way analysis of variance for Ho_2. Should significant main effects exist, the Newman-Keuls test was applied for making pairwise comparisons among adjusted means.[14]

Omega square was computed for levels of intelligence, feedback treatments, and interaction between levels of intelligence and feedback treatments in an attempt to find the proportion of variance in the dependent variables accounted for by the independent variables.[15]

Review of Literature

The typical instructional method used to help students develop psychomotor skills is the demonstration. The instructor explains and shows the student how to perform a certain manipulative task, and the student practices until he becomes proficient.

In this section, literature and research which seemed most relevant to this study, either through the nature of the subjects included or the methodology utilized, are reported. The related literature describing research studies utilizing the feedback method in psychology and industrial education is

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[14] Ibid., pp. 91-93.

[15] William L. Hayes, Statistics for the Social Sciences, (Second Edition; New York: Holt, Rinehart, and Winston, Inc., 1973), pp. 488-514.

reported first; a more specific coverage of feedback effects upon the performance of the mentally retarded follows.

Taylor[16] conducted an experiment to test the effectiveness of instant videotape replay as a source of immediate visual feedback in the development of a gross motor skill. The gross motor skill employed in the study was the whip kick, a kick that is used in swimming the breaststroke.

Forty-eight male subjects were assigned randomly to one of four experimental treatment groups on the basis of their initial skill level in the whip kick. Two of the factors, videotape and verbal, were used and were varied in two ways - their use or nonuse. Thus, the four experimental treatment groups were as follows: a combination of videotape feedback and verbal feedback, videotape feedback only, verbal feedback only, and no feedback (control group).

A statistical analysis of multivariate analysis of variance showed significant F's for the main effects of videotape and verbal feedback. No interaction effects were significantly different.

As a result of the significant main effects of videotape and verbal feedbacks, a test for critical differences between pairs of group means was performed. The results of this test showed the combination of videotape and verbal feedback group

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[16]Wayne G. Taylor, "The Effectiveness of Instant Videotape Replay as a Source of Immediate Visual Feedback Upon Learning or Improving Performance of a Gross Motor Skill," (Unpublished Doctor's Dissertation, The University of Tennessee, 1971).

to be significantly superior to the group with verbal feedback only and the no feedback group. Among the three skill level groups, the combination of videotape and verbal feedback had a greater effect on the middle skill and low skill level groups, whereas no effect was found in the high skill level group.

The effect of videotape instant visual feedback on learning gross motor skills in tennis was studied by Armstrong.[17]

Eighteen subjects were selected randomly from fifty-four female students enrolled in beginning tennis at the University of Southern Mississippi. Each subject was assigned to one of three treatment groups: the standard lecture-demonstration group, the lecture-demonstration plus videotape replay group, and the videotape replay only group. The task selected for the study was the backhand and forehand stroke in tennis. The classes met forty minutes, two days a week, for ten weeks. A female physical education teacher was in charge of all three classes.

One way analysis of variance was used to analyze the collected data. The result indicated that the use of videotape instant visual feedback did not significantly affect the learning of gross motor skills in tennis as opposed to

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[17]Wayne J. Armstrong, Jr., "The Effects of Videotape Instant Visual Feedback on Learning Specific Gross Motor Skills in Tennis," (Unpublished Doctor's Dissertation, University of Southern Mississippi, 1971).

the standard lecture-demonstration program; however, the motivation of the subjects, as measured by the motivational index, was significantly influenced by the use of videotape instant visual feedback as opposed to the standard program. There was no difference observed between the two videotape groups.

A study to investigate the effects of visual feedback as provided by a videotape recorder upon overall motor task performance and retention of second, fourth, and sixth graders was conducted by Wrenn.[18]

The data were collected during the fall term of the 1969-1970 academic year at East Silver Spring Elementary School, Silver Spring, Maryland. Seventy-two subjects were chosen for the study, with an equal number of students represented by each grade. The subjects were then assigned randomly to either a control or an experimental group. Each subject was given twelve trials to perform the Motor Performance Multi-Recording Instrument Test.

A 2 x 3 x 2 factorial design, with repeated measures on the last factor, was used for analyzing the data. Factor I was videotape feedback; Factor II was grade level; and Factor III was the performance of each subject.

The analysis of data revealed a significant difference in performance for the two treatment groups, with the

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[18]Jerry P. Wrenn, "Videotape Feedback as It Influences Elementary School Children in Their Ability to Perform a Motor Task," (Unpublished Doctor's Dissertation, University of Maryland, 1970).

videotape feedback group being superior. Related to this finding was a nonsignificant treatment-by-level interaction, indicating that the difference in overall performance between treatment groups was reflected at each grade level.

Hurley[19] investigated videotape and checksheet feedback methods on fourth and sixth grade students. A constructional activity which involved layout, holding, cutting, and assembling operations was used as the psychomotor task.

A total of eighty subjects were selected randomly from one fourth and two sixth grade classes at Model Laboratory School, Eastern Kentucky University. The operations to be performed were demonstrated to the student by the use of an eight mm motion picture and audiotape recording. After each subject received instruction, the operations were performed, and the respective feedback treatment was administered. Then the operations were performed a second time. A rating scale in the form of a checksheet was used to score the performance of each student.

The results of the study showed that the checksheet feedback improved performance significantly, whereas the videotape feedback improved performance significantly only when used in conjunction with the checksheet.

Baker[20] conducted an experiment to ascertain the effects of varying speeds of videotape feedback on secondary school

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[19]Hurley, op. cit.

[20]Baker, op. cit.

students enrolled in grades eight through twelve of the Public School System of Centralia, Missouri.

Sixty sixth grade students, after being placed in either high or low perceptual speed groups through the use of a standardized perceptual speed test, were assigned randomly to the three treatment groups. The treatments consisted of giving the subjects videotape feedback of their own performance at normal speed, slow motion, and no feedback at all. Screwdriving was selected as the task. A demonstration showing and explaining the procedure to be used in performing the task was presented to each student by means of videotape recording. The student then had an opportunity to perform the task. After several videotape feedbacks at normal or slow motion, the final performance was measured by the use of a standardized gauge to insure uniformity.

Results of the study revealed that no significant difference existed between the slow motion and normal motion videotape feedback groups; however, there was a significant improvement in performance by the videotape feedback group as compared with the control group.

The effect of videotape-checksheet feedback, videotape-panel rating feedback, and videotape feedback only on seventh grade students in the Public School System of Columbia, Missouri, in performing the screwdriving task was studied.[21]

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[21]Gary Meers, "Effects of Various Feedback Media on Psychomotor Achievement," (Unpublished Doctor's Dissertation, University of Missouri-Columbia, 1972).

Thirty-nine students were selected from the total population of one hundred students and were assigned randomly to each treatment group.

It was found that the students who received videotape-panel rating treatment performed at a significantly higher level when compared with the other two treatments - videotape-checksheet and videotape only.

Ricker, Pincard, Gilmore, and Williams[22] studied the effects of motion pictures upon self-visualization among mental retardates. In this study self-visualization via motion picture was evaluated as a method for improving interpersonal interaction during group counseling with mental retardates. The results failed to show its superiority over either the technique of visualizing other retarded subjects' interactions during counseling or counseling without audio-visual supplements. The behavior studied in this report was primarily verbal interaction rather than manual manipulation, and the medium used was film rather than videotape.

A study to compare the effect on manual manipulation of videotaped self-visualization with traditional verbal intervention among educable mentally retarded subjects was conducted by De Roo and Haralson.[23]

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[22]H. R. Ricker, C. M. Pincard, Jr., A. S. Gilmore, and C. J. Williams, A Comparison of Three Approaches to Group Counseling Involving Motion Pictures with Mentally Retarded Young Adults, McDonald Training Center Foundation, Inc., Tampa, 1967.

[23]William M. De Roo and Howard L. Haralson, "Increasing Workshop Production Through Self-Visualization on Videotape," Mental Retardation, August, 1971, pp. 22-25.

Twelve educable mentally retarded young adults served as subjects in this study. Criteria for selection of subjects included an age of at least 16 years, a WAIS Full Scale intelligence quotient between 50 and 85, absence of any apparent emotional or physical condition which would have prevented normal performance of experimental tasks, and residence at the Central Wisconsin Colony, Madison, Wisconsin, at the time of the study.

A pretest-posttest control group design without randomization was used. Random assignment of subjects to experimental and control groups was not used because the number of available individuals who satisfied the selection criteria was relatively small. The limitation of nonrandom assignment was reduced by having each subject serve as his own control. Each subject's production increase on a simple repetitive assembly task over a three-week span was the measure employed. A production increase of 50 per cent or more was determined a priori as the criterion for satisfactory improvement.

The task selected for the study was a repetitive bench type assembly task typical of work found in the sheltered workshop setting. This task consisted of four stages: (1) One leather washer was inserted into each of twenty-five holes of the same size counter sunk in a table top; (2) A scaffolding nail was inserted into a hole in the center of each washer; (3) The assembled nails and washers were removed

from the holes in the table top; and (4) The twenty-five completed assemblies were deposited in an empty cardboard box. The task was then repeated, a new box being filled each time, until the end of the work session. Daily work sessions of fifteen minutes' duration were held for fifteen consecutive weekdays over a three-week period. Subjects were taught the task by the experimenter during the first day session.

The experimental treatment (videotape) self-visualization was accomplished by video recording subjects' work for fifteen minutes and replaying the recording for the subject soon after completion of the work session. The control treatment (verbal) was much the same with the major exception of self-visualization. For fifteen minutes following each work session the experimenter met with each control subject and mentioned nonproductive activities that had occurred.

Upon completion of the study, production increases were calculated for all subjects and the statistical test was applied. Using the predetermined criterion of 15 per cent increase, all subjects in the experimental group were designated as high gain and all those in the control group were designated as low gain. The statistical analysis, using a one-tailed test, indicated that the difference in production gain between the experimental and control groups was significant at the .001 level of confidence. Changes in specific nonproductive activities were not quantified but appeared to favor the experimental group.

Need for the Study

The majority of research studies in education for the disadvantaged and handicapped began around 1960. A major portion of this research has been general in nature in relation to teaching methods, procedures, and materials that are effective in teaching mentally retarded students.

Recognizing and accepting the challenge of educating the mentally retarded does not guarantee success. Many teachers do not have the training, the knowledge of methods and materials, or the "tools" with which to work with these students.[24]

Feedback in the form of knowledge of results has been proved to be effective in teaching psychomotor skills to students with normal intelligence. There is a definite need for study of the effect of feedback on the mental retardates.

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[24]Kenneth R. Johnson, Teaching the Culturally Disadvantaged. (Science Research Associates, Inc., College Division, 165 University Avenue, Palo Alto, California, 1970), p. XIX.

CHAPTER II

DESIGN AND PREPARATION FOR THE EXPERIMENT

In Chapter I the statement of the problem, purpose, and assumptions of the study were presented. Terms were defined, sources of data and method of study were described, and the statement of hypotheses to be tested was presented. In addition, a review of related literature was summarized and reported. This chapter reports the research design, the feedback treatments, nature of population and sampling procedure, and preparation of the experimental materials and equipment. This chapter also includes a discussion of the results of the pilot study.

Research Design

This investigation was conducted as a six-group controlled experiment. A 2 x 3 randomized block design discussed by Kirk[25] was used. Because the research is concerned with a population of mentally retarded, variability among subjects may mask or obscure the treatment effects. By the use of a randomized block design, such variability in individual differences could be minimized. As reported in Chapter I, fifteen subjects were assigned randomly to three treatment groups, after which the subjects were placed in high or low intelligence levels.

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[25]Kirk, op. cit., pp. 131-150.

The data produced by the study were subjected to a two-way analysis of covariance for Ho_1 and a two-way analysis of variance for Ho_2 to ascertain the effect of feedback treatments. The results of the analysis of data are presented in Chapter IV.

Feedback Treatments

Videotape recordings were used to give the subjects information related to their performance. Each subject received instruction regarding the correct method of folding letters, inserting letters into envelopes, sealing envelopes, and affixing stamps.

After the subject performed these steps, the following feedback treatments were administered:

Feedback Treatment - Videotape (VT). Immediately after performing the task, the subjects receiving videotape feedback treatment viewed a videotape recording of their own performance. The videotape was shown on a television monitor located in the experimental laboratory.

Feedback Treatment - Verbal (VB). Subjects who received verbal feedback treatment rated their own performance with the aid of a checksheet, which was read by an instructor. Because of the subjects' limited reading ability, the instructor's assistance was needed.

Feedback Treatment - Videotape and Verbal (VT-VB). Videotape and verbal feedback treatment required the subjects to view their own performance on videotape as in the videotape

treatment, while at the same time rating their own performance with the aid of a checksheet.

Three practice sessions, each of two minutes' duration, and the feedback treatments thereafter were given each subject.

Control Factors

To maximize the effects of the experimental factors, the following variables were held constant for all individuals during the experiment:

1. Presentation of instruction via videotape
2. Materials and physical facilities
3. Psychomotor task
4. Experimenter and judge
5. Criterion measure
6. Laboratory lighting, heating, and ventilation

The subjects experienced the treatments on an individual basis. The students were told that they were to watch the instructional videotape on the television monitor and then perform the task which was to be demonstrated. The technique for providing feedback was not mentioned. Other factors beyond the control of the researcher were minimized through the design of the experiment or were assumed to operate randomly for all groups.

Nature of the Population and Sampling Procedure

The population for this study was 370 mentally retarded students enrolled at Higginsville State School, Higginsville, Missouri, during the second semester of the 1972-1973 school

year. Permission to conduct this research investigation was granted by Dr. C. Duane Hensley, Director of Mental Retardation Section, Division of Mental Health, and Miss Ara Morris, Superintendent of the Higginsville State School. Because of the nature of the population, special permission was received from Mr. Richard Ashby, General Counsel for the Division of Mental Health.

Higginsville State School does not offer a course in which the envelope stuffing task is taught. It was assumed that those who had prior personal experience in this area were distributed randomly in the groups.

The sample selected for this study was obtained from the list of students at Higginsville State School using the following criteria:

1. Between 14 and 25 years of age
2. Between 45 and 83 intelligence quotient using the Wechsler Intelligence Scale
3. No apparent emotional or physical condition which would prevent normal performance of the task

The sample was chosen by assigning sequential numbers to those students who met the criteria. Using a table of random numbers,[26] ninety students were selected. These students were then divided into two groups based on their intelligence level. Students with intelligence quotients above the median of the entire group were assigned to a high

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[26] J. E. Wert, C. O. Nerdt, and J. S. Ahmann, Statistical Methods in Education and Psychological Research. (New York: Appleton-Century-Crofts, 1954).

group; those whose intelligence quotients were below the median were assigned to a low intelligence group. The names of the students in the high intelligence group, while in alphabetic order, were assigned sequential numbers. Again using a table of random numbers, the students in the high intelligence group were assigned to one of the three treatment groups. This method of assignment was used in an attempt to equalize the treatment groups. The same procedure was also used for the low intelligence group.

Because of the short experimental period, none of the subjects selected for the study were lost due to absence or transfer.

Preparing the Materials and Equipment

The materials used by the subjects for the study were prepared by the researcher. Commercially available window envelopes were used, but the letter was developed by the researcher. Also a letter frame with lines indicating one-third of the letter was prepared. An illustration of the prepared letter frame is shown in Figure 2.

The demonstration of the task to be performed was recorded on one-inch videotape to control the presentation variable. Because of the nature of the task, there were no instructional films available; therefore, the video and audio portion of the demonstration videotape recording was prepared by the researcher.

A rating scale to measure each subject's task performance was not available commercially and was developed by the researcher.

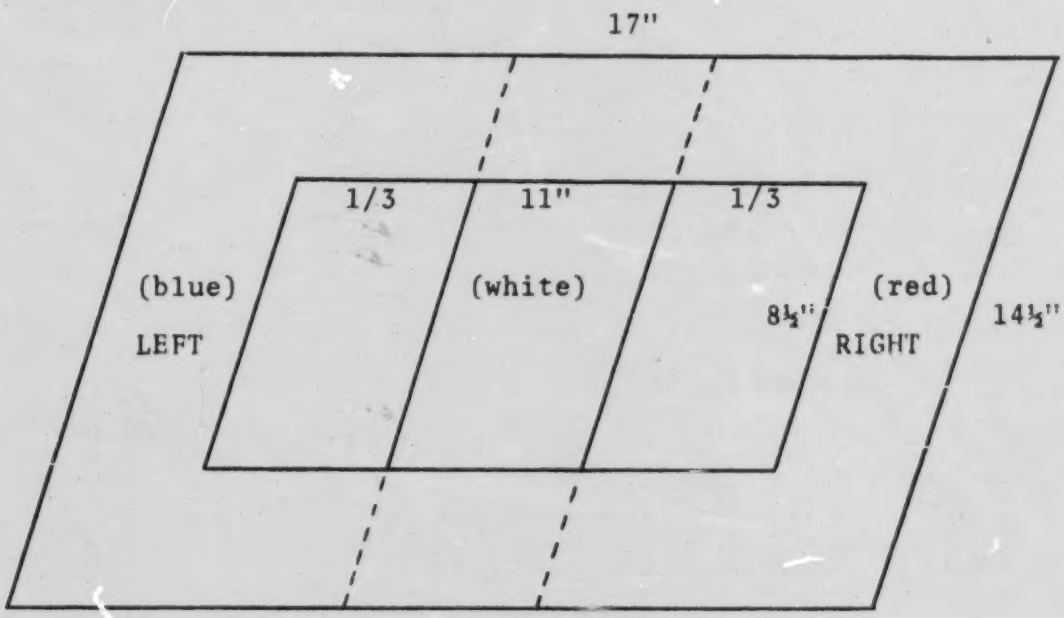

Figure 2

Letter Frame

Developing the Psychomotor Task. A mailing task consisting of folding letters, inserting letters into envelopes, sealing envelopes, and affixing stamps was selected for the following reasons: First, the task was chosen because it is representative of the tasks performed at a sheltered workshop. Secondly, the activity is relatively simple; however, it is sufficiently complex to measure the subject's improvement in the level of performance. Thirdly, it is within the ability range of the mentally retarded students selected for the study.

Preparing the Instructional Videotape. A two-minute demonstration of the task to be performed was presented to each subject individually by means of a television videotape recording. The materials used in the demonstration were identical to those used by the subjects.

The first step in preparing the demonstration was writing the script (Appendix A). After the script was prepared, the demonstration was recorded on one-inch Ampex videotape. The steps were performed by a demonstrator while a narrator read the script. The videotape recording equipment was operated by a third person, leaving the narrator free to coordinate the script with the action.

Preparing the Checksheet. A rating scale in the form of a checksheet was developed for use by subjects receiving verbal treatment and a combination of videotape and verbal treatment to rate their performance of the task (Appendix B).

The scale was designed to give information concerning the correctness of performance. Each item on the scale was in the form of a question which asked the student whether or not he had performed the specific steps correctly.

To produce the rating scale, it was necessary to identify the steps needed to perform the task and note the steps completed. To further identify necessary steps, the researcher asked two of the special education students at Marshall Area Vocational School, Marshall, Missouri, to perform the same task while he observed. As each student

performed the task, his movements were recorded and analyzed for further identification of key steps.

The observations were recorded and the steps needed to complete the task were identified. From these recorded observations, a scale listing sixteen steps for performing the task was produced.

Each item of the scale was a question to the subject which asked whether or not a specific step had been performed correctly. When rating his performance, the student responded to each item by answering "yes" or "no"; and the response was recorded in the appropriate box by the judge.

A rating scale with more detailed description of each step to be evaluated was also developed and used by the judge to score the student's performance (Appendix C). The rating scale developed for use by the subjects receiving verbal treatment and a combination of videotape and verbal treatment is worded to the level of understanding by the mentally retarded, whereas the scale used by the judge is more descriptive.

As the student performed each step (or item) listed on the rating scale, the judge marked either a "yes" or "no" response based on whether or not the step was performed correctly. The student was given a score of one (1) if the step was performed correctly and a zero (0) if it was not.

Equipment Setup. The experiment was conducted in one of the classrooms of the Education Building. The materials

and equipment were arranged so that the subjects could progress logically through the process of (1) seeing the demonstration, (2) performing the task, (3) receiving the treatment, and (4) being evaluated. Only the subject, the judge, and the experimenter were in the laboratory.

The equipment used in providing the feedback to the groups receiving videotape or a combination of videotape and verbal treatments consisted of an Ampex 5100, one-inch videotape recorder for recording the subject's performance, and a Motorola 18" receiver/monitor for play back. A GBC VF-302 camera (F 1.8, 25mm-100mm zoom) was connected to the recorder. In the recording process the lens of the camera were positioned to record the subjects from about the chest down. Included in the camera's view were the materials, the letter frame, and the subject's hands.

Pilot Study

To improve the videotape presentation, to verify the operational condition of the videotape equipment, and to test the instruments, a pilot study was conducted. The subjects were selected from the students enrolled in the vocational education program at Marshall State School and Hospital, Marshall, Missouri. As a result of the pilot study, several changes were made. The rating scale, which contained sixteen items, was modified by deleting those items which did not discriminate between high scoring and low scoring subjects.

Items on which all subjects performed either correctly or incorrectly did not discriminate. After the modification, the scale contained twelve items. A panel of judges consisting of three vocational instructors in the Pre-sheltered Workshop Training program at the State School was used to rate the subject's performance in the pilot study. It was decided, however, that one judge only would rate the performance in the main study, because there were no disagreements among the judges in rating the performance in the pilot study. Also, the wording on the instructional tape and the checksheet was changed from technical to more general terms for easier interpretation by the subjects. It was decided that the number of envelopes completed within the time limit as well as the correctness of each envelope completed would be used as criterion measures.

Physical Facilities

The study was conducted in a classroom measuring 16 x 22 feet. The room was adjacent to the regular classrooms and arranged so that only materials and equipment needed for the experiment were accessible. For the duration of the study, this room was used only for conducting the experiment. Students were called to the room from their respective classrooms and were able to enter and leave without disturbing any class. Because of the location of the laboratory, the subject was not disturbed while

participating in the experiment. The room was well lighted with flourescent lights, and the temperature was constant throughout the experimental period.

The equipment was placed as shown in Appendix D. The student sat at the back of the worktable. The camera, approximately fifteen feet from the student, was positioned directly in front of the student at a height of five feet from the floor. The videotape recorder/playback unit was placed on a separate table away from the worktable. The receiver/monitor was on one end of the worktable but positioned so that the student did not face it directly while performing the task.

Summary

The purpose of this investigation was to study the effect of videotape, verbal, and a combination of videotape and verbal feedback upon the performance of a simple psychomotor task by mental retardates.

The investigation was conducted as a six-group controlled experiment using a 2 x 3 randomized block design with intelligence levels by feedback treatments. All other variables which could affect the outcome of this experiment were held constant or controlled as much as possible. Fifteen subjects randomly selected were assigned to each of the three experimental groups, after which the subjects were assigned to high or low intelligence quotient groups.

A total of ninety subjects were selected randomly from approximately 370 mentally retarded students at Higginsville State School, Higginsville, Missouri, during the second semester of the 1972-1973 school year.

An envelope stuffing task was chosen as the psychomotor task. The measures of performance were the students' scores on the checksheet for the first and last trials of the envelope stuffing task, as well as the total number of envelopes stuffed.

The treatment was administered on an individual basis in a specially equipped classroom. The envelope stuffing task to be performed was demonstrated step by step to the student via videotape. After each subject received instruction, the task was performed, and the respective feedback treatment was administered.

Three practice sessions were given to each student, after which the final task was performed.

A rating scale in the form of a checksheet was developed by the researcher, which was used by students who received the verbal treatment as well as the treatment involving videotape and verbal feedback to rate their performance. Another scale was developed and used by the judge to score the performance of each student. To produce the rating scale, the researcher analyzed the task and identified the steps which needed to be performed in succession. The steps then became items in the form of questions.

A pilot study was conducted to improve the videotape presentation, to verify the operational condition of the videotape equipment, and to test the instruments before the actual experiment was initiated. As a result of the pilot study, the number of items in the rating scale was reduced and the wording was modified. The wording on the instructional tape and the rating scale was changed to more general terms for easier interpretation by the subjects. Also, it was decided that one judge could rate the students' performance as effectively as a panel of judges.

The experiment was conducted in a room adjacent to the regular classrooms. Equal facilities and materials were provided for all subjects in the study.

CHAPTER III

CONDUCTING THE EXPERIMENT

In Chapter II the research design and the preparation for the experiment were described. In this chapter a discussion of the procedure by which the experiment was conducted is presented. The method of grouping, instructional presentation, administration of treatments, and scoring of the instruments designed to secure the experimental measures are explained.

Method of Grouping

An intelligence quotient derived from the Wechsler Intelligence Scale was used as a basis for dividing the sample into two groups. The students with borderline, mild, or moderate mental retardation[27] were used in the study. Because of such secondary problems as emotional or physical, the lower level mental retardates were not used. Students with intelligence quotients ranging from a low of 45 to a high of 83 were used in the experiment. Students with an intelligence quotient above the median were assigned to the group designated as the "high intelligence quotient" group; those with a quotient

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[27]Rich Heber, A Manual on Terminology and Classification in Mental Retardation, The American Association on Mental Deficiency, 1961, p. 59.

below the median were assigned to the group designated as the "low intelligence quotient" group. Students in the high intelligence quotient group were then assigned randomly to one of the three treatment groups using a table of random numbers. The same procedure was followed for the low intelligence quotient group. Each treatment cell was assigned 15 students. Table I shows the means and standard deviations for each of the cells as well as the total means for each group. In Appendix E is a record of all scores recorded.

TABLE I

MEANS AND STANDARD DEVIATIONS OF INTELLIGENCE QUOTIENTS FOR FEEDBACK TREATMENTS AND LEVELS OF INTELLIGENCE QUOTIENTS

			Type of Feedback			
			Videotape	Verbal	Videotape & Verbal	TOTAL
I.Q.	High	$\bar{X}$	66.47	67.20	67.60	67.09
		SD	6.02	6.99	8.34	
		n	15	15	15	
	Low	$\bar{X}$	52.53	51.20	52.33	52.02
		SD	4.44	3.47	3.66	
		n	15	15	15	
TOTAL GROUP		$\bar{X}$	59.50	59.20	59.96	59.55

Instructional Presentation

A one-inch videotape was developed and prepared by the experimenter for the purpose of instructing the subjects in the procedure for performing the task of folding letters, inserting letters into envelopes, sealing envelopes, and affixing stamps. The sound was synchronized with the picture. The script started by presenting the following introduction to the subjects:

> The demonstration you are about to see will explain how to fold the letter, put it into the window envelope, seal the envelope, and put on the stamp. Watch closely, and you will be able to do the same.

As the student heard the introduction, the view of the worktable containing all the materials needed in performing the task was presented; namely, envelopes, letters, a letter frame, a water sponge, paper towels, and stamps. The actual demonstration was taped at close range and provided the student with a view which included only the demonstrator's hands, materials, and the portion of the worktable where the task was performed. The narration gave directions for performing each step in the task. The directions were given one at a time as needed to complete each of the four subtasks in logical order. When the last step was completed, the tape ended by showing the demonstrator holding the finished envelope with address showing through the window and the stamp affixed for the student to view.

The experiment was conducted during the period April 23, 1973 - May 4, 1973. As each student entered the laboratory, he or she was greeted and asked to be seated. Next the student was told that a television presentation would describe a task in which he or she would be involved. The student was told to watch closely as no questions could be answered until the experiment was completed. The materials were shown to the students, and the names of the materials were identified. The videotape instructions were then shown to each student on an individual basis. The presentation was the same for all subjects.

Base Rate Measure

After viewing the instructional videotape, the student was told to wait for the signal, by the judge, to begin. The experimenter set up the videotape recorder, started the recording, and gave the signal to the judge, who in turn, signaled to the student to begin. A videotape recording was made of the performance of those students receiving videotape feedback and a combination of videotape and verbal feedback. The verbal instructions were the same for each subject. The student was allowed to complete the task, while the performance was rated on an evaluation sheet. The rating was done in such a way that the student would not be aware that the performance was being evaluated. This base rate measure obtained from the first trial of

the task which represented a source of variation was used as a covariate in the analysis of covariance.

Administration of Treatments

After the base rate test was completed, the following feedback treatments were administered immediately to subjects who were previously assigned to one of the three treatments:

Feedback Treatment - Videotape (VT). The subjects receiving videotape feedback treatment viewed a videotape recording of their own performance immediately after the completion of the task. The videotape was recorded as the student performed the task. To facilitate the students' comparison of their own performance with the instructional videotape demonstration, the camera used for videotaping was located in exactly the same position as that of the camera when the demonstration was taped. This would allow the students to view their performance at the same angle and distance as the demonstration was viewed during the instructional presentation.

After the videotape of the student's performance was completed, the student was instructed to face the television monitor and view his own performance. When the videotape was finished, three practice sessions, each of two minutes' duration, and the videotape feedback treatments thereafter were given each subject. Two minutes were used for each practice session because it was found that the average time

needed to complete the task was approximately two minutes, with some individual variation among the subjects.

Feedback Treatment - Verbal (VB). The subjects who received verbal feedback treatment rated their own performance with the checksheet developed by the researcher.

The checksheet presented specific questions to the subject relative to the performance of the steps of each task as they were presented in the instructional videotape. The questions were read to the subject by the judge. Because of the student's limited reading ability, the judge's assistance was needed.

When the verbal feedback treatment was completed, the subjects were allowed three practice sessions, after which the feedback treatment was administered.

Feedback Treatment - Videotape and Verbal (VT-VB). The same procedure as used in Treatment VT was followed. However, Treatment VT-VB required the students to rate their performance with the aid of a checksheet, while at the same time viewing the videotape of their own performance. The checksheet used here was the same as the one used in Treatment VB. As the subjects watched the videotape, they were asked the question relative to that particular step in the videotape.

Upon completion of the treatment, the subjects were allowed three practice sessions, the same procedure used in the other treatments - Treatment VT and Treatment VB.

The same general procedure was followed for all subjects, regardless of the treatment administered. The

subjects entered the experimental laboratory, viewed the instructional videotape, performed the task, received the feedback treatment, and practiced three times. The feedback treatment was then administered.

Evaluative Test

After the completion of the base rate measure and three two-minute practice sessions, the evaluative test was administered. The same checksheet as that used in the base rate test was used by the judge, only this time the subject's performance was not recorded on videotape. At the completion of the evaluative test, the subject was escorted to one end of the laboratory, which was petitioned off from the main laboratory, and was asked to stuff envelopes for thirty minutes. At the end of the session, the total number of mailable envelopes that the student completed was counted and used as another dependent variable.

The instructional videotape was rewound and envelopes and letters were refilled in preparation for the next student. Also the checksheet was coded with the subject's number, base rate or evaluative test, and the scores. When subjects completed the thirty-minute task, they were thanked for their participation and sent back to the classroom.

Scoring the Test. As the subject performed each step (or item) listed on the checksheet, the judge marked either a "yes" or "no" based on whether or not the step was performed

correctly. The subject was given a score of one (1) if the step was performed correctly and a zero (0) if it was not. However, when the thirty-minute task was evaluated, mailability of the letter was the main criterion used. If the address was showing through the window envelope, the envelope was properly sealed, and the stamp affixed in the upper right hand corner, the subject was given one (1) point.

Establishing Evaluation Criteria. Three workshop training program instructors were used as judges in the pilot study. Prior to the pilot study, the judges attended a training session. During the training session, the criteria were presented for a "yes" answer for each item on the checksheet. Following a discussion of the criteria for each item, the judges rated the performance of sample subjects on a videotape recording especially designed for this purpose. The training videotape contained mentally retarded subjects performing the same task as the actual subjects. After the judges rated the subjects in the training videotape, the checksheets were jointly analyzed by the researcher and the judges to ascertain whether or not the subjects had been rated according to the established criteria. For items on which there was disagreement among the judges, the criteria were reviewed and additional sample subjects were rated. These final ratings indicated that the judges agreed on the established criteria. The pilot study performance was then rated. Because the ratings on the pilot study demonstrated

uniformity among the judges, it was decided that one judge would be used in the main study.

Summary

Intelligence quotients derived from the Wechsler Intelligence Scale were the basis for dividing the students into the high intelligence quotient group and the low intelligence quotient group. The students in the high intelligence quotient group were then assigned randomly to three treatment cells using a table of random numbers. The same procedure for assigning students to treatment cells was used on the low intelligence quotient group.

As each subject reported to the experimental laboratory, he or she was greeted and instructed to view a videotape recording which demonstrated the steps needed to complete the envelope stuffing task. Following the instructional videotape presentation, each subject was asked to perform the same task using the materials provided. This was used as a base rate test. Upon completion of the task, the respective feedback treatment was administered, and the subjects were allowed to practice the task three times. Practice sessions were also followed by the feedback treatment. A final test was administered with no videotape recording this time.

A checksheet was used by the judge to produce performance scores for each subject. To establish the evaluation criteria, a training session was provided for the judges. After they rated and reviewed the performance of the sample subjects, the researcher and the judges established the criteria jointly.

The scoring of the tests was accomplished by counting the number of "yes" answers on the checksheet. The total number of mailable envelopes completed by a subject in a thirty-minute session was used as another dependent variable.

CHAPTER IV

MEASUREMENT AND ANALYSIS OF DATA

In Chapter III the procedure used in conducting the experiment was presented and discussed. It included the criteria used in group selection, a description of the instructional presentation, the measures (base rate and evaluative tests) utilized, and administration of feedback treatments. In this chapter, an analysis of data and a report of the experimental findings are presented.

The experimental treatments in this study were based on the assumption that the knowledge of results of one's performance would improve subsequent performance of the same task. Feedback was varied in the following three ways by allowing the students: (1) to view a videotape recording of their own performance, (2) to rate their own performance by the use of a checksheet, and (3) to view a videotape recording and at the same time rate their own performance using a checksheet.

The experimental hypotheses in this study were tested at the .05 level of statistical significance by computing F values using two-way analysis of covariance techniques for Ho_1 and two-way analysis of variance techniques for Ho_2. If significant main effects were found, the Newman-Keuls[28]

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[28]Kirk, op. cit., pp. 91-93.

test was applied for making pairwise comparisons between adjusted means.

Scores on the Envelope Stuffing Task

The following hypothesis was subjected to statistical analysis for the purpose of studying the effect of the treatment variables on the performance of the envelope stuffing task.

Test of Hypothesis 1:

Ho_1: There is no significant difference among adjusted mean scores on an envelope stuffing task by students experiencing the three experimental treatments.

Table II presents the means and standard deviations for the performance scores of students differing in level of intelligence and receiving differing feedback treatments which were used as base rate measures for calculating the analysis of covariance.

Table III presents the means, standard deviations, and adjusted mean scores for levels of intelligence and feedback treatments. The scores in each cell represent the mean scores before adjustment on the final measure and the adjusted mean scores using the scores of the base rate measure. The scores of the base rate measure were obtained on the first trial of the performance of the envelope stuffing task, and the measure represented a source of variation that had not been controlled by the experimental design and that could have affected the final measure of performance.

TABLE II

MEANS AND STANDARD DEVIATIONS FOR THE ENVELOPE STUFFING TASK SCORES OF THE BASE RATE MEASURE AT DIFFERENT LEVELS OF INTELLIGENCE BY FEEDBACK TREATMENT

		Type of Feedback			
		Videotape	Verbal	Videotape & Verbal	TOTAL
I.Q.					
High	$\bar{X}$	7.40	7.47	7.13	7.33
	SD	2.10	1.88	2.17	
	n	15	15	15	
Low	$\bar{X}$	6.53	6.60	6.53	6.56
	SD	2.36	1.76	2.29	
	n	15	15	15	
TOTAL	$\bar{X}$	7.00	7.03	6.83	6.95

As a result of the use of the base rate measure, all of the treatment cells in the high intelligence quotient group were adjusted downward - the videotape treatment by .27, the verbal treatment by .31, and the combination of videotape and verbal treatment by .12. All of the treatment cells in the low intelligence quotient group were adjusted upward - the videotape treatment by .25, the verbal treatment by .50, and the combination of videotape and verbal by .25.

The total mean score for the videotape treatment was adjusted downward .01 while the combination of videotape and verbal treatment was adjusted upward .06. The verbal treatment was adjusted downward .05.

TABLE III

MEANS, STANDARD DEVIATIONS, AND ADJUSTED MEANS FOR THE ENVELOPE STUFFING TASK SCORES AT DIFFERENT LEVELS OF INTELLIGENCE BY FEEDBACK TREATMENT

			Type of Feedback			
			Videotape	Verbal	Videotape & Verbal	TOTAL
I.Q.	High	$\bar{X}$	9.60	10.87	10.20	10.22
		SD	1.59	0.83	1.66	
		n	15	15	15	
		ADJ $\bar{X}$	9.33	10.56	10.08	9.99
	Low	$\bar{X}$	8.73	9.87	9.40	9.33
		SD	2.43	1.36	1.92	
		n	15	15	15	
		ADJ $\bar{X}$	8.98	10.37	9.65	9.57
TOTAL		$\bar{X}$	9.17	10.37	9.80	9.78
		ADJ $\bar{X}$	9.16	10.32	9.86	

Table IV presents the two-way analysis of covariance data for adjusted mean scores of the student performance.

To test the strength of association between the independent variables and the dependent variable, ω^2 was calculated. The omega squares for levels of intelligence, feedback treatments, and the interaction represent the proportion of variance in the criterion measure on the final test accounted for by independent variables (intelligence quotients and feedback treatments).

TABLE IV

TWO-WAY ANALYSIS OF COVARIANCE FOR THE ENVELOPE STUFFING TASK SCORES

Sources of Variation	Adjusted S. S.	df	Adjusted M. S.	F	ω^2
Level of I.Q.	3.92	1	3.92	2.29	0.02
Feedback Treatments	20.54	2	10.27	7.65*	0.13
Level of I.Q. x Feedback Treatments	0.07	2	0.04	0.03	-0.02
Error	111.48	83	1.34		

F .95 (1,83) = 3.98
F .95 (2,83) = 3.13

*$p < .05$

The F value for the feedback treatments was 7.65, which exceeded 3.13, the table value required for significance at the .05 level. Since the F value was significant for feedback treatments, the null hypothesis (Ho_1) of no significant difference among adjusted mean scores on an envelope stuffing task was rejected.

The Newman-Keuls test was applied for making multiple comparisons among adjusted group mean scores as reported in Table V. These comparisons were necessary to ascertain which pairs of feedback treatments were significantly different.

The F value required for two means separated by two steps was .85, while the value for those means separated by three

TABLE V

NEWMAN-KEULS TEST FOR DIFFERENCES AMONG ADJUSTED GROUP MEAN SCORES ON THE ENVELOPE STUFFING TASK

Adjusted Means		Differences Among Adjusted Means		
		$\bar{X}_{VT}$	$\bar{X}_{VT-VB}$	$\bar{X}_{VB}$
$\bar{X}_{VT}$	9.16	-	.70	1.16*
$\bar{X}_{VT-VB}$	9.86		-	.46
$\bar{X}_{VB}$	10.32			-

W_2 = .84

W_3 = 1.01

*$p < .05$

steps was 1.01. Thus the videotape feedback treatment group and the verbal feedback treatment group were found to have performed significantly different when tested at the .05 level of significance. No statistically significant difference in performance was found between the videotape feedback treatment group and the combination of videotape and verbal feedback group, or between the verbal feedback treatment group and the combination of videotape and verbal feedback group.

Total Number of Envelopes Stuffed

The second null hypothesis in this study was tested at the .05 level of statistical significance by computing the F value using two-way analysis of variance.

Test of Hypothesis 2:

Ho_2: There is no significant difference among mean numbers of total envelopes stuffed by students experiencing the three experimental treatments.

The total number of mailable envelopes was counted at the end of the thirty-minute session. The main criterion used in counting the total number of envelopes was mailability, while small variations from the checksheet were disregarded.

In Table VI means and standard deviations for the total number of envelopes stuffed at different levels of intelligence for the feedback treatments are presented.

For the videotape feedback group and the verbal feedback group, there was a difference in means of .49, while 1.57 was the difference between the videotape feedback group and the combination of videotape and verbal feedback group.

The high intelligence quotient group obtained a mean of 22.93, which was 5.84 higher than the mean for the lower intelligence quotient group. There was a difference in means of 2.06 between the highest treatment group (verbal feedback) and the lowest treatment group (combination of videotape and verbal).

TABLE VI

MEANS AND STANDARD DEVIATIONS FOR THE TOTAL NUMBER OF ENVELOPES AT DIFFERENT LEVELS OF INTELLIGENCE BY FEEDBACK TREATMENTS

			Type of Feedback			
			Videotape	Verbal	Videotape & Verbal	TOTAL
I.Q.	High	$\bar{X}$	24.67	23.60	20.53	22.93
		SD	5.56	5.80	5.72	
		n	15	15	15	
	Low	$\bar{X}$	16.07	18.13	17.07	17.09
		SD	4.67	3.31	4.48	
		n	15	15	15	
	TOTAL	$\bar{X}$	20.37	20.86	18.80	20.01

In Table VII the results of a two-way analysis of variance to test the statistical significance at the .05 level of significance are presented.

The F value for the feedback treatments was 1.39, which was less than needed for significance at the .05 level. Therefore, the null hypothesis (Ho_2) of no significant difference was accepted. However, the F value for the high and low intelligence quotient groups was 30.71, which exceeded the table value required for the .05 level of significance. There was no significant interaction between levels of intelligence and feedback treatments.

TABLE VII

TWO-WAY ANALYSIS OF VARIANCE FOR THE TOTAL NUMBER OF ENVELOPES ON THE ENVELOPE STUFFING TASK

Sources of Variation	S. S.	df	M. S.	F	ω^2
Level of I.Q.	768.55	1	768.55	30.71*	0.24
Feedback Treatments	69.76	2	34.88	1.39	0.01
Level of I.Q. x Feedback Treatments	100.41	2	50.21	2.01	0.02
Error	2102.27	84	25.03		

F .95 (1,84) = 3.98
F .95 (2,84) = 3.13

*$p < .05$

Summary

In this study the effect of feedback treatment upon student performance on an envelope stuffing task was investigated. Two criterion measures were used for the statistical analysis: performance scores for the envelope stuffing task and the total number of mailable envelopes. Feedback was varied in three ways by allowing students: (1) to view a videotape recording of their own performance; (2) to rate their performance with the aid of a checksheet; and (3) to view a videotape recording of their performance while rating the performance by means of a checksheet.

A two-way analysis of covariance was used to test the results of the feedback treatments on the performance scores and their adjusted means. Analysis of the data revealed that there was a significant difference in student performance among feedback treatment groups. Therefore, the null hypothesis (Ho_1) of no significant difference was rejected. The Newman-Keuls Multiple Comparison Test revealed that the students in the verbal feedback treatment group performed significantly higher than those in the videotape feedback treatment group. No significant differences among other pairs were found as a result of the test.

The analysis also revealed that there was no significant difference in the performance of students with differing levels of intelligence. There was no significant interaction between levels of intelligence and feedback treatments.

A two-way analysis of variance was used for testing the total number of mailable envelopes that the student completed in thirty minutes. It was found that there was a significant difference between high and low intelligence quotient groups. However, the analysis revealed no significant main effect for feedback treatment, which resulted in accepting the null hypothesis (Ho_2) of no significant difference among mean numbers of total envelopes stuffed. The data also revealed that there was no significant interaction between levels of intelligence and feedback treatments.

CHAPTER V

SUMMARY, CONCLUSIONS, DISCUSSION OF RESULTS, IMPLICATIONS, AND PROBLEMS FOR FURTHER STUDY

The purpose of this study was to compare experimentally the effect of feedback treatments upon the quality of manipulative psychomotor tasks. More specifically, the study attempted to answer this question: Which of the following three feedback methods has the greatest effect upon psychomotor performance of mental retardates: videotape feedback, verbal feedback, or a combination of videotape and verbal feedback?

Summary

The research study was conducted with a 2 x 3 randomized block design. Ninety subjects were selected for the study from the mentally retarded students enrolled at Higginsville State School, Higginsville, Missouri. An intelligence quotient derived from the Wechsler Intelligence Scale was used as a basis for dividing the sample into two groups. Only the students with borderline, mild, or moderate mental retardation (a classification adopted by the American Association of Mental Deficiency) were used in the study, because of secondary problems such as physical or emotional involved with lower level mental retardation. Students with intelligence quotients above the median of the entire group

were assigned to the group designated as the "high intelligence quotient" group; those with intelligence quotients below the median were assigned to the group designated as the "low intelligence quotient" group. Students in the high intelligence quotient group were then assigned randomly to one of the three treatment groups: videotape feedback, verbal feedback, or a combination of videotape and verbal feedback. Each treatment cell was assigned 15 students. The same procedure was used for the low intelligence quotient group.

The experiment was conducted in a laboratory adjacent to the regular classrooms. The room contained no materials or equipment other than that needed for the study and was arranged so that the students could proceed in a logical order.

A mailing task consisting of folding letters, inserting letters into envelopes, sealing envelopes, and affixing stamps was selected as the psychomotor task because the task is within the ability range of the mentally retarded subjects and is representative of the tasks performed at a sheltered workshop.

A demonstration was presented to each student individually by means of a videotape recording. The student was sent from his or her regular classroom to the experimental laboratory where the instruction was presented. Immediately after the demonstration, the student was asked to perform the same task.

The measures of performance were the student's score on the checksheet for the first and last trials of the envelope stuffing task, as well as the total number of envelopes stuffed in thirty minutes. The scoring was accomplished by counting the number of "yes" answers on the checksheet and the total number of mailable envelopes the subject completed in a thirty-minute session.

Three practice sessions, each of two minutes' duration, were given to each subject, after which the final task was performed. The student was then sent to another section of the laboratory and asked to stuff envelopes for thirty minutes. At the end of the session, the total number of mailable envelopes was recorded.

After each subject received the instruction and the task was performed and evaluated, the respective feedback treatment was administered on an individual basis. The subjects in the videotape feedback treatment group viewed their own performance on videotape, whereas those in the verbal feedback treatment group rated their performance on a checksheet. Subjects in the combination of videotape and verbal feedback treatment group viewed the videotape of their own performance while rating the performance by means of a checksheet. Feedback treatments were also administered at the end of each practice session.

A rating scale in the form of a checksheet was used by students in rating their own performance. A more descriptive

rating scale was used by the judge in scoring student performance. To produce the rating scale, the researcher analyzed the task and identified the steps which needed to be performed in sequence. The steps then became checklist items in the form of questions.

A pilot study was conducted to improve the videotape presentation, to verify the operational condition of the videotape equipment, and to test the instruments before the actual experiment was initiated. As a result of the pilot study, the number of items in the rating scale was reduced and the wording was changed to more general terms for easier interpretation by the subjects.

The experiment was conducted during the period April 23, 1973 - May 4, 1973. Experimental and statistical controls were utilized in an effort to maximize the effects of the experimental factors. The following variables were held constant to maximize the experimental control: presentation of instruction via videotape, materials and physical facilities, psychomotor task, experimenter and judge, criterion measures, and the conditions of the laboratory.

Other factors beyond the control of the researcher were minimized through the use of random assignment and analysis of covariance techniques.

The null hypotheses in this experiment were tested at the .05 level of significance through the use of a two-way analysis of covariance for Ho_1 and a two-way analysis of

variance for Ho_2. When significant main effects were found, the Newman-Keuls Multiple Comparison Test was applied to identify pairs of groups which differed significantly.

For performance scores on the envelope stuffing task, the difference between the adjusted mean scores among feedback treatments was significant. Therefore, the null hypothesis (Ho_1) of no significant difference among adjusted mean scores on an envelope stuffing task by students experiencing the three experimental treatments was rejected. The Newman-Keuls Multiple Comparison Test revealed that the students in the verbal feedback treatment (Treatment VB) performed significantly higher than those in the videotape feedback treatment (Treatment VT). No other pairs - verbal feedback treatment (Treatment VB) and a combination of videotape and verbal feedback treatment (Treatment VT-VB), or videotape feedback treatment (Treatment VT) and a combination of videotape and verbal feedback treatment (Treatment VT-VB) - were found to be significantly different.

The analysis also revealed that there was no significant difference in the performance of students with differing levels of intelligence. There was no significant interaction between levels of intelligence and feedback treatments.

For the total number of envelopes the subjects completed in a thirty-minute session, the difference among the group means representing feedback treatments was not significant, which resulted in accepting the null hypothesis (Ho_2) of no

significant difference among mean numbers of total envelopes stuffed by students experiencing the three experimental treatments. However, a significant difference was found between levels of intelligence. The high intelligence quotient group performed significantly faster than the low intelligence quotient group. The interaction of intelligence levels and feedback treatments was not significant.

Conclusions

The findings and conclusions of this study are limited to the extent to which the subjects included in this study were borderline, mild, or moderate mental retardates (a classification used by the American Association of Mental Deficiency). The nature of the psychomotor task, the types of feedback treatment, and the utilization of a checksheet for rating performance are also limiting factors. Thus generalization of this study must be interpreted in light of these limitations and related only to those situations which are deemed similar to the conditions outlined in the study.

The following conclusions may be drawn as a result of the findings of the study:

A significantly higher level of performance was recorded for students who received the verbal feedback treatment than for those who received the videotape feedback treatment alone when measured by the envelope stuffing task on a

checksheet. It may be concluded that verbal feedback is an important factor in skill development among mental retardates regardless of level of intelligence.

For total number of envelopes stuffed, a significantly higher level of performance did not result among subjects receiving different feedback treatments. However, the high intelligence quotient group performed significantly faster in stuffing the envelopes than the low intelligence quotient group.

Therefore, it may be concluded that, regardless of the feedback treatment, faster production can be expected of higher functioning mental retardates.

Since no significant interaction was found in the study between the levels of intelligence and feedback treatments, it is concluded that these factors are not interrelated.

Discussion of Results

The majority of previous research studies have found significant differences in performance due to feedback treatments among normal intelligence subjects. These findings led the experimenter in this study to expect differences in performance among mental retardates.

Armstrong[29] found the standard lecture-demonstration feedback superior in the learning of gross motor skills in tennis to the videotape instant visual feedback.

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[29]Armstrong, op. cit.

Hurley[30] also found that the checksheet feedback improved performance significantly, whereas the videotape feedback improved performance significantly only when used in conjunction with the checksheet. Although the psychomotor task utilized in this research study and those used by Armstrong and Hurley are different, the verbal feedback method, either in the form of a checksheet or a lecture-demonstration, has resulted in a higher level of performance than the videotape feedback method.

Taylor[31] found the combination of videotape and verbal feedback group to be significantly superior to the group with verbal feedback only and the no feedback group.

It was expected that the combination of videotape and verbal feedback would be more effective than the videotape feedback only or verbal feedback only. However, the result of this study showed that the group of students who experienced combination feedback did not perform significantly higher than those who experienced videotape feedback only or verbal feedback only. The adjusted mean of the combination feedback group was higher than the adjusted mean of the videotape feedback only group, but not sufficient to warrant a significant difference as a result of the Newman-Keuls Test. The inadequacy of the method of providing the

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[30]Hurley, op. cit.

[31]Taylor, op. cit.

combination feedback, in view of the subject's mental ability, might have contributed to this lack of a significant difference. The difference between the adjusted means of the combination feedback group and the videotape feedback only group was .70, as compared to .46 separating the combination feedback group and the verbal feedback group.

De Roo and Haralson[32] conducted a study to compare the effect on manual manipulation among educable mentally retarded and found that the videotape self-visualization with verbal feedback was superior in workshop activities to the verbal feedback alone. This result supports Taylor's findings. It is, therefore, suggested that further research be conducted employing a different method of providing the combination feedback treatment.

Implications

The following implications are suggested by the findings and the conclusions:

1. It was found that the subjects who received verbal feedback treatment performed the task at a significantly higher level than those who received videotape feedback treatment. This seems to imply that the verbal interaction between students and instructor is one of the important factors in skill development. This also implies that students should receive thorough and directive information from instructors

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[32]De Roo and Haralson, op. cit.

concerning their performance in order to attain a higher level of psychomotor achievement. A rating scale should be considered by the instructor since it provides a systematic means whereby direct verbal feedback may be provided.

2. Those subjects receiving feedback by means of videotape recording alone performed at a lower level of achievement than did those receiving verbal feedback or a combination of videotape and verbal feedback. This would imply that the use of videotape recordings for giving feedback of student performance needs to be limited, unless it is combined with verbal feedback. Therefore, vocational instructors may want to employ a less expensive and more accessible device such as a checksheet rather than a videotape recording as a method of providing feedback to students.

3. A combination of videotape and verbal feedback appears to be less effective in raising the level of psychomotor performance than verbal feedback alone. The reason for this comparative ineffectiveness might have been that the students experienced difficulty in following the videotape recording of their performance while at the same time trying to answer questions on the checksheet. Therefore, implications would be that further research involving different methods of providing the combination feedback should be conducted. One way of providing the combination feedback would be to allow the subject to view a videotape

recording of his performance first, followed by the verbal feedback on a checksheet.

4. Vocational instructors should receive training in the techniques of task analysis. During this process, time should be spent in analyzing tasks, listing steps to be performed, and developing rating scales in the form of a checksheet in order that instructors may be able to provide the most effective types of feedback.

5. Although the level of intelligence was used for a blocking purpose, it was found that the subjects in the high intelligence quotient group stuffed significantly more envelopes in a given period of time than those in the low intelligence quotient group regardless of the feedback treatments. This implies that the higher functioning mental retardates could be expected to perform considerably faster than the lower functioning subjects.

Since all three feedback methods appeared to raise the performance scores on the envelope stuffing task, further research in this area is needed and the effects of feedback on the performance of other psychomotor tasks also need further exploration.

Problems for Further Research

This experiment has pointed out a number of related problems for further research. They are as follows:

1. What effect would the feedback treatments have on the performance of other psychomotor tasks by mental retardates, on either more complex or simpler tasks?

2. What effect would the feedback treatments have on the performance of the psychomotor task by lower functioning mental retardates?

3. What effects would other methods of feedback treatment have on the performance of the psychomotor task?

4. What effect would methods of providing combination feedback other than that used in this study have on performance?

5. What effect would the feedback treatments have on the performance of the psychomotor task by other ability groups?

6. How would the findings of this study vary with subjects in other age groups?

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APPENDIX A

Narration for

the Instructional Videotape

NARRATION FOR THE INSTRUCTIONAL VIDEOTAPE

Introduction

The demonstration you are about to see will explain how to fold the letter, put it into the window envelope, seal the envelope, and put on the stamp. Watch closely, and you will be able to do the same.

Steps in Performing the Task

1. Take the top paper off the stack and place it on the table in the letter frame.

2. Bring the right hand side of the letter, outlined in red, to the middle and fold with fingers along the red line.

3. Bring the left hand side of the letter, outlined in blue, to the middle and fold with fingers along the blue line.
(Comment: Now the printed address is facing up.)

4. Take the envelope in your left hand with the flap side open and your folded letter in your right hand. Put the letter into the envelope. Look in the envelope window to see if the printed address is showing.

5. Turn the envelope over and place it on the table. Pick up the water sponge and apply water to the gummed areas of the flap side of the envelope.

6. Seal the envelope by pressing firmly along the edges. Remove any excess water with a paper towel.

7. Turn the envelope over to the front side. Pick up the stamp. With the water sponge, apply water on the back side of the stamp and put it on the upper right hand corner along the edges of the envelope. Remove any excess water with a paper towel.

Now you have completed the task.

APPENDIX B

Checksheet for Evaluation of Performance Used by Students

EVALUATION OF PERFORMANCE USED BY STUDENTS

Student No.: _____

	Yes	No
I. POSITIONING AND FOLDING THE LETTER		
1. Did you take the top letter off the stack and place it in the letter frame?	☐	☐
2. Did you bring the right hand side of the letter to the middle and fold it along the red line?	☐	☐
3. Did you bring the left hand side of the letter to the middle and fold it along the blue line?	☐	☐
II. INSERTING THE LETTER INTO THE ENVELOPE		
1. Did you hold the envelope with the flap side open and the front side up?	☐	☐
2. Did you hold the letter with the printed address on the front side?	☐	☐
3. Did you put the letter into the envelope so that the address is showing through the window?	☐	☐
III. SEALING THE ENVELOPE		
1. Did you apply water across the gummed areas of the envelope?	☐	☐
2. Did you seal the envelope so that the edges are tightly sealed?	☐	☐
3. Did you remove any excess water with a paper towel?	☐	☐
IV. AFFIXING THE STAMP		
1. Did you apply water across the backside of the stamp?	☐	☐
2. Did you put the stamp on the upper right hand corner along the edges?	☐	☐
3. Did you remove any excess water with a paper towel?	☐	☐
TOTAL	___	___

APPENDIX C

Checksheet for Evaluation of Performance Used by Judge

EVALUATION OF PERFORMANCE USED BY JUDGE

Group:____ Base Rate or Evaluative Student No.: ___

		Yes	No
I.	In Positioning and Folding the Letter, Did the Student:		
	1. take the top letter off the stack and place it in the letter frame so that the top of the letter is toward the left hand side, face down?	☐	☐
	2. bring the right hand side of the letter to the middle and fold it along the red line so that the top and bottom edges of the letter are parallel?	☐	☐
	3. bring the left hand side of the letter to the middle and fold it along the blue line so that the top and bottom edges of the letter are parallel?	☐	☐
II.	In Inserting the Letter into the Envelope, Did the Student:		
	1. hold the envelope with the flap side open and the front side up with the left hand?	☐	☐
	2. hold the letter with the printed address on the front side with the right hand?	☐	☐
	3. put the letter into the envelope so that the full address and all four corner marks are showing through the window?	☐	☐
III.	In Sealing the Envelope, Did the Student:		
	1. apply proper amount of water only to the gummed areas of the envelope?	☐	☐
	2. seal the envelope so that the flap side is back to its original position and the edges are tightly sealed?	☐	☐
	3. remove any excess water with a paper towel?	☐	☐

Appendix C - Continued

EVALUATION OF PERFORMANCE USED BY JUDGE

Student No.: 1

IV. In Putting the Stamp, Did the Student:	Yes	No
1. apply proper amount of water on the back side of the stamp thoroughly?	☐	☐
2. put the stamp on the upper right hand corner so that the edges of the stamp are parallel to the sides of the envelope and position the stamp right?	☐	☐
3. remove any excess water with a paper towel?	☐	☐

TOTAL POINTS: ____

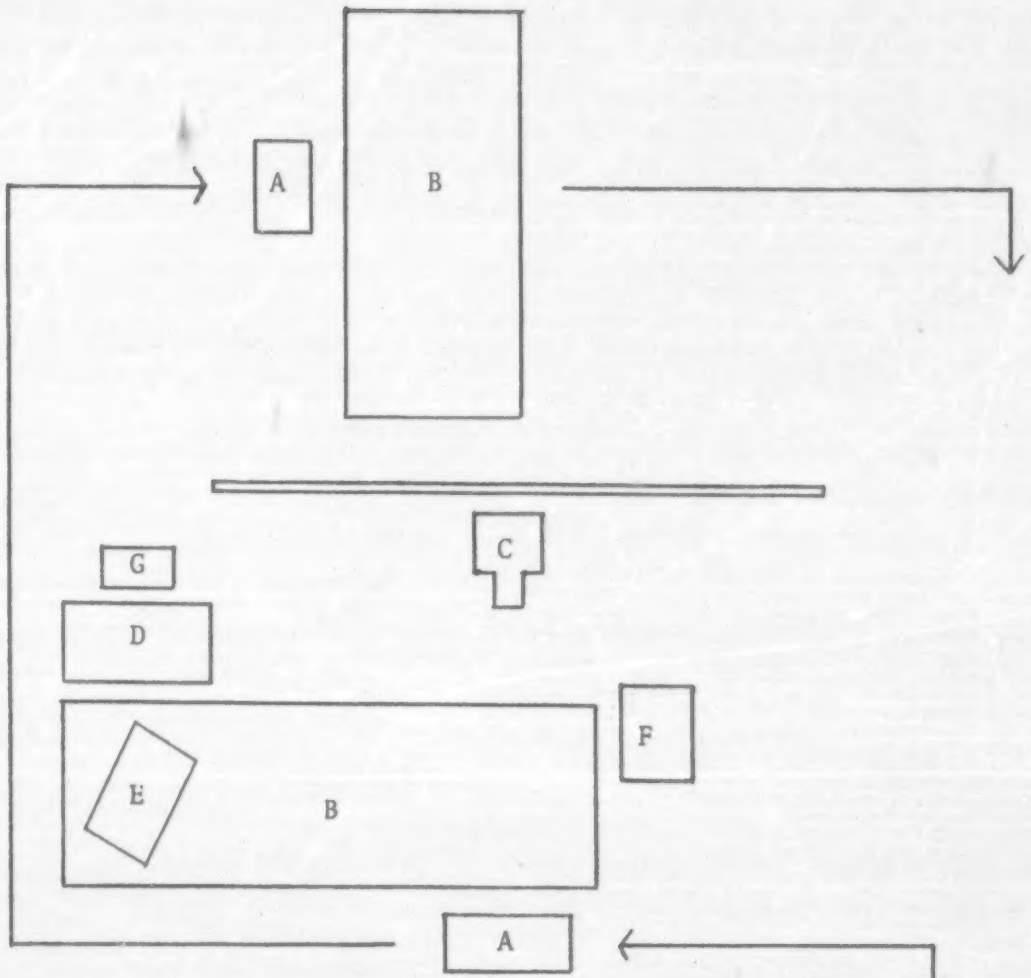
TOTAL ENVELOPES STUFFED: ____

APPENDIX D

Equipment Setup for Conducting the Experiment

Equipment Setup for

Conducting the Experiment



A. Subject
B. Worktable
C. Television Camera
D. Videotape Recorder/Playback
E. Television Monitor/Receiver
F. Judge
G. Experimenter

APPENDIX E

Student Performance Scores

and

Intelligence Quotients

TABLE VIII

STUDENT PERFORMANCE SCORES ON THE BASE RATE MEASURE, EVALUATIVE TEST AND THE TOTAL NUMBER OF ENVELOPES BY LEVELS OF INTELLIGENCE AND FEEDBACK TREATMENTS

		TYPE OF FEEDBACK											
		Videotape				Verbal				Videotape & Verbal			
		I.Q.	Test 1	Test 2	Total Envelopes	I.Q.	Test 1	Test 2	Total Envelopes	I.Q.	Test 1	Test 2	Total Envelopes
High I.Q. Students	N_1	67	9	11	24	67	9	10	28	77	11	12	23
	N_2	61	4	6	19	60	6	10	18	62	6	9	25
	N_3	72	10	11	32	58	8	10	12	83	7	10	21
	N_4	59	4	8	17	64	8	12	29	60	5	10	22
	N_5	64	7	10	31	79	7	10	26	61	4	6	11
	N_6	63	7	8	30	78	7	11	20	62	5	12	13
	N_7	72	8	10	26	65	6	10	27	68	6	11	29
	N_8	81	9	11	19	72	6	11	25	58	5	8	18
	N_9	63	6	9	26	61	7	11	25	79	8	11	17
	N_{10}	74	10	11	27	58	6	10	17	70	6	10	19

TABLE VIII (Continued)

		TYPE OF FEEDBACK											
		Videotape				Verbal				Videotape & Verbal			
		I.Q.	Test 1	Test 2	Total Envelopes	I.Q.	Test 1	Test 2	Total Envelopes	I.Q.	Test 1	Test 2	Total Envelopes
	N_{11}	68	9	10	30	64	4	11	22	59	9	12	11
High	N_{12}	63	10	12	31	63	10	12	16	63	9	10	28
I.Q.	N_{13}	66	6	10	23	72	11	12	32	80	11	12	21
Students	N_{14}	60	7	9	19	73	10	12	28	67	8	10	26
	N_{15}	64	5	8	16	74	7	11	29	65	7	10	24
MEANS	N_T	66.5	7.4	9.6	24.7	67.2	7.5	10.9	23.6	67.6	7.1	10.2	20.5

TABLE VIII (Continued)

		TYPE OF FEEDBACK											
		Videotape				Verbal				Videotape & Verbal			
		I.Q.	Test 1	Test 2	Total Envelopes	I.Q.	Test 1	Test 2	Total Envelopes	I.Q.	Test 1	Test 2	Total Envelopes
Low I.Q. Students	N_1	45	2	3	11	55	3	9	18	51	2	5	10
	N_2	56	7	10	16	46	7	11	13	57	9	11	10
	N_3	56	8	11	18	55	7	9	18	53	2	6	11
	N_4	47	3	10	15	54	6	9	22	52	8	11	19
	N_5	57	9	10	16	48	6	10	19	56	6	10	18
	N_6	56	7	9	25	45	7	10	16	53	7	9	16
	N_7	56	9	11	26	54	7	11	17	49	8	10	18
	N_8	47	5	8	19	53	10	11	24	57	7	11	17
	N_9	55	4	5	18	52	5	7	12	52	8	9	16
	N_{10}	52	8	10	12	54	6	8	18	46	8	10	23

TABLE VIII (Continued)

		TYPE OF FEEDBACK											
		Videotape				Verbal				Videotape & Verbal			
		I.Q.	Test 1	Test 2	Total Envelopes	I.Q.	Test 1	Test 2	Total Envelopes	I.Q.	Test 1	Test 2	Total Envelopes
Low I.Q. Students	N_{11}	46	9	10	10	52	4	11	16	52	7	10	16
	N_{12}	54	7	10	14	46	7	10	23	57	8	11	26
	N_{13}	49	7	9	16	49	7	9	17	53	3	7	16
	N_{14}	55	9	10	13	53	8	12	20	45	7	10	19
	N_{15}	57	4	5	12	52	9	11	19	52	8	11	21
MEANS	N_T	52.5	6.5	8.7	16.1	51.2	6.6	9.9	18.1	52.3	6.5	9.4	17.1

VITA

Ok Dong Park was born on July 11, 1937, in Kwangju, Chonnam, Korea. He received his elementary and secondary education in Kwangju public schools from 1944 to 1956. From 1956 to 1960 he attended Seoul National University, Seoul, Korea, and in March, 1960, received the Bachelor of Arts degree in Economics. He came to the United States of America to continue his education at Northeast Missouri State University, Kirksville, Missouri, in September, 1965, and earned the Master of Arts degree in Business and Office Education in August, 1967. From 1970 to 1973 he attended the University of Missouri - Columbia.

He served in the Republic of Korea Air Force as a commissioned officer from 1960 to 1964. From 1967 to 1970 he taught business education at Lincoln County Reorganized School District I, Silex, Missouri. While a graduate student at the University of Missouri - Columbia, he served as a graduate research assistant from 1970 to 1972. He is currently employed at Marshall State School and Hospital, Marshall, Missouri, as a Director of Vocational Education.

In April, 1968, he married the former Mi Ja Rhee. They have two children - Jean Amy and Edward Hoon.

The undersigned, appointed by the Dean of the Graduate Faculty, have examined a thesis entitled

The Effects of Feedback Media Upon Psychomotor Performance of Mental Retardates

presented by Ok D. Park

a candidate for the degree of Doctor of Philosophy

and hereby certify that in their opinion it is worthy of acceptance.

J. A. Silvano

W. R. Miller

Mary Jane Lang